CLAIMS

We claim:

1. A process for preparing a foundry shape by the cold-box process which comprises:

(a) forming a foundry mix comprising a major amount of aggregate and an effectively binding amount of a binder system comprising:

(1) a phenolic resole resin component, and

(2) an isocyanate component,

wherein the phenolic resin component comprises (a) an alkoxy-modified phenolic resole resin component such that the mole ratio of alcohol to phenol used to prepare said alkoxy-modified phenolic resole resin is less than 0.25:1.0, and (b) at least one oxygen-rich, polar organic solvent component, wherein the solvent portion of the phenolic resin component of the binder system amounts to no more than 40 % by weight, based upon the weight of the phenolic resin component, and the amount of oxygen-rich polar organic solvent is at least 50 weight percent based on the total weight of the solvent in the phenolic resin component; and

wherein either the phenolic resin component, isocyanate component, or both of said components contain a fatty acid ester having from 1 to 12 carbon atoms in the alcohol chain of the fatty acid ester;

(b) forming a foundry shape by introducing the foundry mix obtained from step (a) into a pattern;

(c) contacting foundry shape mix with a volatile tertiary amine catalyst; and

(d) removing the foundry shape of step (c) from the pattern.

2. The process of claim 1 wherein the oxygen-rich polar, organic solvent is selected from the group consisting of glycol ether esters, glycol diesters, glycol diethers, cyclic ketones, cyclic esters, cyclic carbonate, and mixtures thereof.

3. The process of claim 2 wherein the fatty acid ester is part of the phenolic resin component and is derived from an alcohol having from 4 to 10 carbon atoms.

4. The process of claim 3 wherein the fatty acid ester is the butyl ester of tall oil fatty acids.

5. The process of claim 4 wherein the amount of said binder in said foundry mix is about 0.6 percent to about 5.0 percent based upon the weight of the aggregate.

6. A process of casting a metal which comprises:

(a) preparing a foundry shape in accordance with claims 1, 2, 3, 4, or 5;

(b) pouring said metal while in the liquid state into and a round said shape;

(c) allowing said metal to cool and solidify; and

(d) then separating the molded article.

7. A binder system comprising:

(a) a phenolic resole resin component, and

(b) an isocyanate component,

wherein the phenolic resin component comprises (a) an alkoxy-modified phenolic resole resin component such that the mole ratio of alcohol to phenol used to prepare said alkoxy-modified phenolic resole resin is less than 0.25:1.0, and (b) at least one oxygen-rich, polar organic solvent component, wherein the solvent portion of the phenolic resin component of the binder system amounts to no more than 40 % by weight, based upon the weight of the phenolic resin component, and the amount of oxygen-rich polar organic solvent is at least 50 weight percent based on the total weight of the solvent in the phenolic resin component; and

wherein either the phenolic resin component, isocyanate component, or both of said components contain a fatty acid ester having from 1 to 12 carbon atoms in the alcohol chain of the fatty acid ester.

8. The binder system of claim 7 wherein the oxygen-rich polar, organic solvent is selected from the group consisting of glycol ether esters, glycol diesters, glycol diethers, cyclic ketones, cyclic esters, cyclic carbonate, and mixtures thereof.

9. The binder system of claim 8 wherein the fatty acid ester is part of the phenolic resin component and is derived from an alcohol having from 4 to 10 carbon atoms.

10. The binder system of claim 9 wherein the fatty acid ester is the butyl ester of tall oil fatty acids.